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## 10 Steps in the High-Tech Evolution of Pro Football Helmets

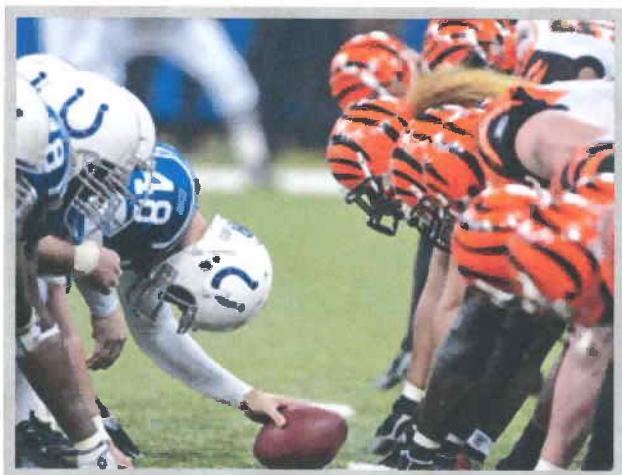
With tackles regularly drilling NFL players at [more than 150 g's](#), their heads need the best protection possible. In this exclusive kickoff weekend excerpt from the new PM book [How a Curveball Curves: The Incredible Science of Sports](#), track the history of brain safety on the gridiron, from "head harnesses" to face masks.

By Andrew Gaffney

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Cincinnati Bengals and Indianapolis Colts players at the line of scrimmage prior to the snap during the game at the RCA Dome in Indianapolis, Indiana, in December 2006.

Scott Boehm/Getty Images

December 18, 2009 3:18 AM

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**When you strap on a football helmet**, part of you feels as if you're going to war, like some medieval knight of old about to wage hand-to-hand combat. The reality is that football is just a game, but one that comes with the risk of physical injury. That's why the players wear helmets.

It's no secret that quarterbacks Troy Aikman of the Dallas Cowboys and Steve Young of the San Francisco 49ers retired because of repeated head injuries. Their departure focused more attention on helmets and the need to further protect players against debilitating and life-threatening concussions.

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In 2002, Riddell developed a new Revolution helmet designed to reduce the incidence of concussion. Schutt Sports Group, the other major helmet manufacturer, followed suit with an improved helmet of its own called DNA. A three-year, Riddell-financed study of high-school players by the University of Pittsburgh Medical Center found that the annual rate of concussion was 5.3 percent for players wearing the Revolution helmet and 7.6 percent for players wearing standard helmets.

While no helmet can prevent a concussion, these helmets offer a protection level that is unprecedented. It's been only 60 years since

helmets were made mandatory in the NFL and in colleges. In fact, former President Gerald Ford was one of those players who braved the game without a helmet, in the early 1930s, as a center for the Michigan Wolverines. And while that opened the door for a lot of one-liners about the need for helmets, that little tidbit does illustrate how far head protection has come in the interim.

## Helmet History

Although helmets did not become standard gear until after World War II, some pioneering players wore primitive head covering as far back as the early 1900s. The earliest versions, called "head harnesses," were made of soft leather and were predominantly designed to cover the ears. Because the flaps on the original head harnesses covered the ear completely, however, they were criticized for hindering communication on the playing field. The first helmets offering full protection of the skull and featuring holes in the earflaps were introduced between 1915 and 1917. Although the flat-top caps were still made of soft leather, they offered some suspension, rather than resting directly on the skull.

During the 1920s and 1930s, makers began to utilize harder leathers and some fabric cushioning for greater protection. Helmets also began evolving from the flat-top shape, adopting more of the teardrop shape of the skull and allowing the impact of a blow to slide to one side rather than being absorbed head-on.

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▲ The Evolution of the Helmet

## Birth of the Modern Helmet

The granddaddy of helmet innovation, however, came in 1939, when the John T. Riddell Company of Chicago introduced the first plastic football helmet. In addition to being stronger than leather models, the plastic helmet proved to be more durable. Riddell is credited with adding the first face mask, also plastic, in 1940 and moving the helmet strap from the Adam's apple to the chin.

Despite its performance improvements, the plastic helmet did have to overcome some hurdles before it would drastically change the game. Because plastics and other materials were scarce during World War II, some of Riddell's early models were not particularly well made. In fact, after Fred Naumetz of the Los Angeles Rams split nine in one season, plastic helmets were banned from the NFL. (Meanwhile, that same year, Fred Gehrke, another Rams player, and a former art student, became the first to paint a team logo on his helmet.)

Riddell quickly made some refinements in the types of synthetics used for construction, and with some lobbying from coach George Halas of the Chicago Bears, plastic helmets were reinstated in 1949 and soon after became the official helmets of the NFL. Riddell's earliest molded shells still serve as models for modern energy-absorbing helmets, which feature specially molded polycarbon plastic construction.

Exhibit "A"

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and high-tech cushioning systems.

Face masks evolved along the same lines—with early versions often shattering—until the development of the tubular bar in 1955. Popularized by legendary Cleveland Browns quarterback Otto Graham, the single bar soon blossomed into the vertical birdcage worn by today's players. Dark visors were added in the mid-1980s for use by players with eye injuries.

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